

Dr. Bryana Henderson (JPL/Caltech)
Research Scientist/Technologist
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EXPERIENCE

Throughout her career, Dr. Bryana Henderson has used spectroscopy to study reactions in extreme environments, ranging from photolysis and electron-induced reactions in astrophysical ices to laser-induced drug delivery via nanomachines inside cancer cells. Since joining JPL in 2012, she has focused on radiation-induced chemistry of organics and prebiotic materials. Her work probes complex chemistry *in situ* at 5 K to 150 K via a unique two-step (two-color) laser ablation and ionization time-of-flight mass spectrometry method. This study has already confirmed the production of increasingly complex organics in radiated water ices containing small amounts of nitrogen and carbon-containing species *in situ* at 5 K, and continues to provide insight into the low-temperature radiation chemistry of icy surfaces such as those of comets, interstellar grains, and planetary bodies (Europa, Enceladus, etc.).

Dr. Henderson hopes to continue to use spectroscopy and mass spectrometry to study chemistry in unique environments (exoplanet atmospheres, icy bodies, radiation-drenched surfaces, etc.), drawing inspiration from astronomical observations to improve laboratory simulations. With wide-ranging applications of this work (e.g. life detection, instrument design, mission planning), her ultimate goal is to contribute towards understanding of the origins of life and habitability in our solar system and beyond.

EDUCATION

2011	Ph. D., M.S. (Physical Chemistry), UCLA. Graduate Advisor: Jeffrey I. Zink
2005	B.A. (Chemistry), Lawrence University, Appleton, WI. Advisor: Karen Nordell

APPOINTMENTS

2015 – Present	Research Scientist/Technologist, Planetary Ices group, JPL
2012 – 2015	NASA Postdoctoral Fellow, Caltech Postdoctoral Scholar (Mass Spectrometry, Ice Spectroscopy, Radiation Processes), JPL (advisor: Murthy Gudipati)
2011 – 2012	Scientific Consultant, Science and Sensors Technologies (fiber optics, polymer sensor design)
2005 – 2011	Research/Teaching Assistant (Physical Chemistry), UCLA
2005	Research Assistant (Atmospheric Chemistry), NASA-Langley Research Center, Hampton, VA (advisor: Margaret Pippen)
2004	Research Assistant (Spectroscopy), Santa Clara University REU Program
2003	Research Assistant (Geology), Lawrence University

HONORS AND AWARDS

2016	Invited talk, “Frontiers of Solar System Chemistry: Chemistry and Icy Bodies” session, ACS meeting, Philadelphia, PA
2016	Invited talk, “How primitive are comets?” session, Bonn, Germany
2015	Early Career Travel Grant (Outer Planets Assessment Group, OPAG)
2014	American Astronomical Society International Travel Award (Exoplanet Summer Course in the Canary Islands)
2012-2014	NASA Postdoctoral Scholar Fellowship
2011	American Chemical Society WCC/Eli Lilly Travel Award
2005-2010	Regents Scholarship, University Fellowship (UCLA)
2009	NASA Group Achievement Award
2001-2005	Hans H. Hartwig Memorial & Trustee Scholarships (Lawrence University)

PROFESSIONAL ACTIVITIES AND SERVICE

Dr. Henderson is a member of the Astrochemistry Subdivision of the American Chemical Society, a member of the Royal Society of Chemistry, an Affiliate of the Laboratory Astrophysics Division (LAD) of the American Astronomical Association, and has served as a reviewer for NASA proposals. She is a member of the Caltech Management Association and serves as a judge for science fairs. Dr. Henderson has held executive board positions in the campus programming boards at Lawrence University, UCLA, and Caltech.

SELECTED PUBLICATIONS

- Henderson, B.L., Gudipati, M., (2015). Direct Detection of Complex Organic Products in Irradiated Astrophysical Ice Analogs. *The Astrophysical Journal*, 800(1), 66.
- Henderson, B.L., Gudipati, M.S. (2014). Plume Composition and Evolution in Multi-Component Ices Using Resonant Two-Step Laser Ablation and Ionization Mass Spectrometry (2S-LAIMS). *Journal of Physical Chemistry A*, 118 (2014) 5454-5463.
- Brown, J.W., Henderson, B.L., Kiesz, M.D., Whalley, A.C., Morris, W., Grunder, S., Deng, H., Furukawa, H., Zink, J.I., Stoddart, & J.F., Yaghi, O.M. (2013). Photophysical pore control in an azobenzene-containing metal-organic framework. *Chemical Physics*, 4(7), 2858-2864.
- Lau, Y.A., Henderson, B.L., Lu, J., Ferris, D.P., Tamanoi, F., & Zink, J.I. (2012). Continuous Spectroscopic Measurements of Photo-Stimulated Release of Molecules by Nanomachines in a Single Living Cell. *Nanoscale*, 4(11), 3482-3489.
- Kuzmanich, G., Simoncelli, S., Gard, M., Spaenig, F., Henderson, B.L., Guldi, D., Garcia-Garibay, M. (2011). Excited State Kinetics in Crystalline Solids: Self-Quenching in Nanocrystals of 4,4'-Disubstituted Benzophenone Triplets Occurs by an n-Type Mechanism. *Journal of the American Chemical Society*, 133(43), 17296–17306.
- George, S., Pokhrel, S., Ji, Z., Henderson, B.L., Xia, T., Linjiang, L., Zink, J.I., Nel, A.E., Mädler, L. (2011). Role of Fe doping in tuning the band gap of TiO₂ for photo-oxidation induced cytotoxicity paradigm. *Journal of the American Chemical Society*, 133(29), 11270–11278.
- Creilson, J.K., Pippin, M.R., Henderson, B.L., Ladd, I.H., Fishman, J., Votápková, D., & Krpčová, I. (2008). Surface Ozone Measured at GLOBE Schools in the Czech Republic: A Demonstration of the Importance of Student Contribution to the Larger Science Picture. *Bulletin of the American Meteorological Society*, 89(4), 505–514.

Ow, F.P., Henderson, B.L., & Zink, J.I. (2007). Multiple Photochemical Reaction Pathways in a Ni(II) Coordination Compound. *Inorganic Chemistry*, 46(6), 2243-2248.